Claims

[1] A modulator-integrated light source in which a semiconductor laser and an electroabsorption optical modulator are integrated on a high-resistance semiconductor substrate; wherein:
said electroabsorption optical modulator has a pair of electrodes arranged on one surface of said high-resistance semiconductor substrate and a prescribed bias voltage is applied to said electrodes; and
said electroabsorption optical modulator is of a configuration that satisfies a condition:

$$L \times B \geq 2000\ \mu m \cdot Gb/s$$

where L is a length of said electroabsorption optical modulator and B is an operating frequency.

[2] A modulator-integrated light source according to claim 1 wherein:
an absorption peak wavelength of said electroabsorption optical modulator is shorter than an oscillation wavelength of said semiconductor laser; and
said electroabsorption optical modulator is of a configuration in which an energy conversion value ΔX of a detuning amount, which is a difference between said oscillation wavelength and said absorption peak wavelength at room temperature, satisfies a condition:

$$40\ meV \leq \Delta X \leq 100\ meV.$$

[3] A modulator-integrated light source according to claim 2, wherein said prescribed bias voltage applied at a minimum operating temperature is 1 V or less.

[4] A modulator-integrated light source according to claim 1 or 2, wherein said pair of electrodes are a P-type electrode and an N-type electrode, and said P-type electrode is a traveling-wave electrode.

[5] A modulator-integrated light source according to claim 4, wherein:
an active layer of said electroabsorption optical modulator has an undoped layer; and
a thickness of said undoped layer gradually decreases with progression in a direction of progression of oscillation light from said semiconductor laser.

[6] A modulator-integrated light source according to claim 1 or 2, wherein active layers of said semiconductor laser and said electroabsorption optical modulator are composed of layers buried by a semiconductor or a dielectric.

[7] A modulator-integrated light source according to claim 6, wherein said buried layers are undoped layers.

[8] A modulator-integrated light source according to claim 1 or 2, wherein quantum wells of an active layer of said semiconductor laser and quantum wells of an active layer of said electroabsorption optical modulator are joined by a butt joint.

[9] A modulator-integrated light source according to claim 8, wherein the quantum wells of said electroabsorption optical modulator are of a structure wherein an energy level of a conductive band of wells is higher than an energy level of a conductive band of the barriers, and moreover, an energy

level of a valence band of the wells is higher than an energy level of a valence band of the barriers.

[10] A modulator-integrated light source according to claim 1 or 2, wherein aluminum is contained in a composition of the active layer of said electroabsorption optical modulator.

[11] A fabrication method of a modulator-integrated light source in which a semiconductor laser and an electroabsorption optical modulator are integrated on a high-resistance semiconductor substrate; said fabrication method comprising:

a first step of growing an active layer having a first bandgap in a region that includes active layers of said semiconductor laser and said electroabsorption optical modulator;

a second step of removing, of the active layer formed in said first step, the portion that corresponds to the region of the active layer of said electroabsorption optical modulator and using a remainder as the active layer of said semiconductor laser; and

a third step of growing an active layer having a second bandgap that differs from said first bandgap in a region that was removed in said second step as the active layer of said electroabsorption optical modulator.